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Monitoring Report for Fiscal Year 2010



Garfield, Iron, Kane, Piute, and Washington Counties, Utah

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Introduction

The purpose of this report is to provide Forest managers and the public with a brief look at the monitoring accomplished during fiscal year 2010 as part of implementing the Dixie National Forest Land and Resource Management Plan (Forest Plan). All references to the year 2010 refer to fiscal year 2010: October 1, 2009, through September 30, 2010. This report does not discuss individual management projects; instead, it gives an overview of specific monitoring items prescribed in the Forest Plan. More information on specific projects is available from the Dixie National Forest, 1789 North Wedgewood Lane, Cedar City, Utah, 84721.

Air Quality

Compliance with Utah State Air Quality Guidelines and Standards

All prescribed burning was implemented in compliance with the Utah Interagency Smoke Management Program. The Forest submitted the annual burn schedule to the Utah Interagency Smoke Management Coordinator as required. Permission to emit smoke was given before each prescribed burn was ignited. In 2010 Dixie National Forest fire managers complied with state air quality standards, with no violations for significantly contributing to particulate matter. Public complaints were monitored by local ranger districts and reported to the Utah Interagency Smoke Management Coordinator. There were fewer than five public comments about smoke concerns for all prescribed fires on the Forest.

Forest fire managers also kept the local communities and the Utah Interagency Smoke Management Coordinator and State Division of Air Quality informed of smoke production and dispersal during wildfire events across the Forest.



Smoke from the Henrie Knolls prescribed fire on the Cedar City Ranger District.

Soils

Long Term Soil Productivity

Two past fire sites were monitored for soil productivity: the Good Day Fire Use Fire on the Powell Ranger District and the Stump Springs prescribed fire on the Escalante Ranger District.

In Good Day fire rill erosion was not evident on any portion the fire, because so much down woody debris was left intact. Soil and bedload movement within ephemeral drainages was not observed anywhere within the burn. Spring runoff and summer thunderstorms have yet to cause any sedimentation or bedload movement in or outside of or within the fire use area. Much of the fuel consumed in the fire was the smaller (1 and 10 hour) fuels which left a interconnected pattern of larger (100 hr and 1000 hr) fuels. The continuity of these remaining fuels eliminated overland flow during snow melt and rain fall.

Within the Stump Springs prescribed fire it is estimated that about 50% of the intermittent stream channels still had some large organic matter (wood) in the stream channel while the remaining 50% did not have any large organic matter in the stream channel. Prior to any runoff event (December), there was perched sediment behind locations where stream channel organic

matter was consumed by the fire. In September, it was observed that the sediment had been released and flushed downstream and the stream channel had scoured and incised moderately. The large organic matter (primarily wood > 3 inches in diameter) plays an important role in the intermittent drainages in this area. This organic matter helps stabilize the stream channel by capturing sediment and minimizing downcutting by dissipating energy during high flow events. When this organic matter is consumed by fire it leaves the stream channel vulnerable to releasing sediment stored in the channel; furthermore the channels capacity to store sediment and reduce energy is decreased while at the same time there is an increase in runoff and hill slope sediment due to the Rx. Based on the observations from this monitoring, future prescribed fires will avoid placing fire in or directly adjacent to intermittent stream channels. This adjustment will be put into practice beginning the spring of 2011.

Compaction

We monitored compaction on the Toad and Corn Creek Salvage Timber Sales on the Escalante Ranger District in 2010. Results confirmed that compaction occurred during skidding on ground based operations (dragging the logs away from the harvest site) and at log landing sites. On average, 4 percent of the timber sale units had experienced a 15 percent increase in bulk soil density. Timber harvests do cause compaction, but monitoring results showed that the proper use of Soil and Water Conservation Practices (SWCPs) kept compaction within acceptable levels.

Upland Areas Adjacent to Riparian Management Areas

Two projects adjacent to riparian areas were monitored in 2010: Ranch Creek and the Middle Antimony Creek Riparian Enclosures on the Escalante Ranger District.

Within the Ranch Creek riparian enclosure since cattle impact has been reduced, Ranch Creek is narrowing in with overhanging banks and increased vegetation heights creating better channel morphology for reduced summer temperatures and greater habitat for Bonneville Cutthroat Trout. This enclosure fence is an all wood post and pole fence and is very effective at keeping cattle out without maintenance.

Within the Middle Antimony Creek riparian enclosure since cattle impact has been reduced, Antimony Creek is beginning to show signs of a more stabilized channel. There is a clear shift from the silt/clays of 2002 toward more sands and gravels now present in 2010. There is a need to perform some maintenance work on this enclosure as evidenced by the fact that cattle were observed inside of the enclosure.



Ranch Creek Exclosure 2010, notice the narrow stream channel.



Ranch Creek in 2002 before installation of riparian exclosure.

Soil and Water Resource Protection – Project Environmental Assessment Mitigating Requirements

Four implementation projects were monitored in 2010.

Fourmile Bench fuels reduction project on the Pine Valley Ranger District – Summer thunderstorms did not cause any sedimentation from equipment operations within the project area. Slash and other debris have to date attenuated erosion and off site sedimentation. Soil displacement was only observed in four small areas that would account for less than 1% of the project area.

Paradise Aspen timber sale project on the Cedar City Ranger District - Observations suggested that ground operations were conducted during wet conditions and resulted in soil compaction and displacement adjacent to the landing. Although compaction did occur adjacent to the log landings, the total detrimental disturbance throughout the timber sale area was well below the 15% forest service handbook threshold. Future yarding operations should be conducted when the soils are below field capacity or when ruts less than 5 inches are not forming. Project design features should continue to include ripping, seeding and distributing slash on the landings prior to completing the Timber Sale Contract.

Sheep Creek fuels reduction project on the Powell Ranger District - Most operations were conducted in either dry conditions much below the field capacity of the soil or when the ground was frozen such that compaction from ground based operations was not evident. There was however a few locations where it was evident that soil disturbance was a result of wet thawed soil conditions or where the tracked machines turned or pivoted. Operators did not operate Bobcat machines within the inner gorge of the stream bottoms and therefore this Design Criteria was adhered to. Additionally, operators didn't mulch cut trees near dry washes but rather placed them in the cut washes to attenuate the continued erosion of the gullies. Spring runoff and summer thunderstorms have not caused any erosion of the paths used by the Bobcat machines above erosion that occurs naturally in the area. Most paths taken by the Bobcat machines are not evident by looking at the soil surface. However there are a few isolated locations where rutting occurred as a result of operating in wet thawed soils.

Dipping Vat fuels reduction project on the Escalante Ranger District - Operations were conducted in either dry conditions much below the field capacity of the soil or when the ground was frozen such that compaction from ground based operations was not evident. There was however some soil disturbance where the tracked machines turned or pivoted. Operators did not operate Bobcat machine within the inner gorge of the stream bottoms and therefore this Design Criteria was adhered to. Additionally, operators didn't mulch cut junipers near gullies but rather placed them in the gullies to attenuate the continued erosion of the gullies. Spring runoff and summer thunderstorms have not caused any erosion of the paths used by the Bobcat machines. The vegetation (primarily grasses) has grown in across most of the disturbed areas increasing the effective ground cover and providing greater protection of soils that were disturbed.

Soil Survey Activities

Data collection for the forest-wide field soil inventory has been completed and entered into a database (as directed in the Forest Plan, page II-52). Soil survey work will now shift to using the database to help with project and landscape scale analysis.

Soil and Water Resource Improvement Needs Inventory

District hydrologists continue to update the forest-wide watershed improvement needs inventory. This data will be used to plan watershed improvement projects. Other district resource specialists and the hydrologists will continue to coordinate the implementation of watershed improvement projects by clearly defining objectives and developing plans well in advance of implementation.

Water

Compliance with State Water Quality Standards

Forest hydrologists sampled and analyzed water quality on the following four sites to compare the results with state water quality standards.

- Antimony Creek, tributary to the East Fork Sevier River
- Water Canyon Creek, tributary to Escalante River
- Santa Clara River a tributary to the Virgin River
- Pinto Creek, a tributary to Newcastle Reservoir

Antimony Creek:

Eight field samples were taken; exceedence occurred with phosphorous on 3 samples. All 3 exceedences were with the acute water quality standard. The months that were exceeded were May 2010, June 2010, and September 2010. The other months were just below the acute level allowed. The month with the highest level of phosphorous was during the high flow associated with the snowmelt during the spring runoff period. This is also when pH for this stream dropped from the average pH measured during the other months by over 2 logarithmic points to a value of 6.0 which exceeds the range of pH standards. Although this was during a high flow, other high flows not associated with spring snowmelt did not show changes in pH or phosphorous commensurate with changes in flow. Phosphorous and pH levels are less likely to have a relationship with flow or sedimentation at this site and more likely to be related to the surrounding geology and perhaps ion elution associated with snowmelt.

Approximately 20% of our samples exceeded the state phosphorus criteria and 7% exceeded the pH standard. One hundred percent of our samples for all the other parameters were in compliance with state water quality standards.

The large change in pH observed in Antimony Creek during the snowmelt generated runoff could be the result of ion elution which has been observed in other locations throughout the world where spring snowmelt plays a large role in the annual hydrograph. Since the sampling is done discretely (once per month) and the temporal extent of some of the parameters is not known, it is difficult to determine if there are negative impacts associated with the temporary acidification of Antimony Creek.

Water Canyon Creek:

Only seven samples were taken at this site due to limited access from the above average amount of snow received during this particular winter. There were no exceedences for phosphorus or pH on the months measured. All months also reported clear water/low turbidities, with very little variation in discharge throughout the year.

Water Canyon Creek flows through Pleistocene age alluvium primarily derived from sedimentary rock. It also goes subsurface for noticeable lengths before reaching the sampling location. Antimony Creek on the other hand is influenced by igneous geology, which tends to have overall higher phosphorous levels. Results from different sampling sites from different years on the forest are starting to show a trend of perpetually exceeding standards for phosphorus, leading to a hypothesis that native geology is playing a measurable role in phosphorus input to many of the streams in southwestern Utah.

Santa Clara River and Pinto Creek:

On the Santa Clara River, nine field samples were taken; exceedence occurred with phosphorous on 4 samples. All 4 exceedences were with the acute water quality standard. The months that were exceeded were October 2009, March 2010, April 2010, and July 2010. The other months were just below the acute level allowed. The month with the highest level of phosphorous, March 2010, was during the high flow associated with the snowmelt during the spring runoff period. The pH for this stream was also unusually low from March 2010-May 2010, though no standards were exceeded.

On Pinto Creek, nine samples were taken; exceedence occurs with phosphorous on 7 samples. All 7 exceedences were with the acute water quality standard. The months that were exceeded were October 2009, and February-July 2010. The other months were just below the acute level allowed. The month with the highest level of phosphorous, March 2010, was during the high flow associated with the snowmelt during the spring runoff period. The pH for this stream was also unusually low from March 2010-May 2010, though no standards were exceeded.

On the Santa Clara River and also in Pinto Creek, approximately 61% of our samples exceeded the state phosphorus criteria. One hundred percent of our samples for all the other parameters were in compliance with state water quality standards.

The Santa Clara headwaters is located on Quaternary alluvial fill, however waters are shed from the Pine Valley Mountains, which are primarily Tertiary (Miocene) intrusive volcanic formations. Pinto Creek is located on Quaternary alluvium. Water supplied to the stream flows across some sedimentary formations, however, much of the upper watershed consists of Tertiary, largely Miocene volcanics. Both the Santa Clara River and Pinto Creek have shown a general trend of exceeding standards due to high phosphorous. The effect of current management practices on phosphorous levels in this region is unclear, though phosphorous in surface water sources is expected from the breakdown of phosphate minerals in the surrounding volcanic material.

Some trends in water chemistry are apparent. Phosphorous levels are highest during spring runoff, and exceedence of state standards appears to be focused during this period for both streams, levels remain high throughout the year. The regularity of high levels of phosphorous in both streams suggests that chemistry of the natural environment is affecting the water chemistry. Both streams are sampled once per month. Attributing the cause of phosphorous levels in the surface water to more specific sources or management practices would require sampling water quality with greater frequency.

Effectiveness of Best Management Practices in Meeting Water Quality Objectives and Goals

SWCPs are recognized as best management practices with the State of Utah Division of Water Quality. SWCPs were monitored at the following two locations in 2010:

1. Toad Salvage Timber Sale, Escalante Ranger District, and

2. Corn Creek Salvage Timber Sale, Escalante Ranger District.

The implementation of a properly spaced skid trail network and adherence to SWCPs relating to soil moisture operational levels and the design and management of log landings was effective in meeting water quality goals and objectives within these two timber sales.

Effectiveness and Maintenance Needs of Watershed Improvements

Four watershed improvement projects were revisited in 2010 to determine the effectiveness and maintenance needs of these improvements.

South Fork Pinto Road Relocation Project on the Pine Valley Ranger District - Overall the obliteration and revegetation has been effective with the exception on the north end of the project where road recontouring has not been effective enough to deter entry with 4 wheel drive or all terrain vehicles. Road fill removed from the floodplain is providing room for the channel to meander naturally and will ultimately lead to a more stable channel. Straw wattles were effective at holding back sediment if placed on slopes less than the angle of repose.

Duck Swains Access Management Project on the Cedar City Ranger District - In 2010, 86% of the road closures were successfully implemented and 88% had successfully revegetated.

Ranch Creek Stream Crossing Project on the Escalante Ranger District - This hardened stream crossing was effective at reducing stream bank erosion and preventing widening of the channel. This worked well because of the funneling design and the rock imbedded in cement hardening which kept livestock on the hardened surface and didn't discourage them from walking on it. Based on the observations from this monitoring, it is recommended a similar design for hardened stream crossings be practiced where moderate use by livestock occurs.

Middle Antimony Stream Crossing Project on the Escalante Ranger District - In November 2009 and June 2010 ocular observations were made concerning the effects of the hardened stream crossing. While it was observed that the hardened crossing had effectively eliminated road erosion and sediment delivery from the road stream crossing it had caused additional erosion immediately upstream and downstream of the crossing by discouraging cattle from using the hardened crossing and instead accessing and crossing the stream next to the hardened crossing. Hardened stream crossings are typically effective at reducing stream bank erosion and preventing widening of the channel at the point of crossing. However, the middle Antimony stream crossing was built using slabs of cement with 2 inch gaps between the slabs and gives the appearance of a cattle guard to the cows discouraging them from using it to cross the stream. This leads to additional bank trampling and erosion near the crossing. Therefore, the forest plan general standards and guidelines found under soil resource management 4B (page IV-49) are not likely being met as a result of the additional erosion. Based on the observations from this monitoring, I would recommend to avoid using cement slabs for hardened crossings if heavy use by livestock is expected.

Accomplishment of Riparian Area Management Goals

Measurements such as pebble counts, cross-sections, and photo points are being collected annually. These data have been used mainly to establish long-term monitoring sites and collect baseline data. In 2010, eleven sites were monitored. Ideally, more than 10 years of data are needed to distinguish a trend in a system. We must continue to collect data for those sites

before we can infer a trend with more certainty. Initial results from the sites are summarized below.

- Antimony Creek. Since cattle impact has been reduced, Antimony Creek is beginning to show signs of a more stabilized channel. There is a clear shift from the silt/clays of 2002 to larger sands and gravels now present in 2010.
- Iron Springs. Keeping livestock off the studied area is resulting in a gradual improvement of the creek channel. There is a low amount of impact from elk and deer that enter the fenced area and grasses appear to be rebounding. The exclosure should continue to be monitored for further restoration signs as they'd appear over time.
- Ranch Creek. Since cattle impact has been reduced, Ranch Creek is beginning to show signs of a more stabilized floodplain.
- Harmon Creek, Lower South and South Creek, Rock Creek and Sweetwater Creek. Are being appraised to determine which channel restoration technique to implement and future monitoring should be done to document the stream's morphology.
- Little Pinto Creek. Heavier substrate has moved downstream and filled the bottom of the channel approximately 6 inches. This can be an indication of a weakened streambed.
- Stout Canyon. There was no major change in the channel structure or substrate over a six year period.
- Water Canyon. There is no major change in the channel structure aside from the reduction of sediment at the bottom of the stream due to the check dam removal.

Fisheries

Fish and Riparian Habitat

Riparian habitat and stream bank stability were monitored during inventories highlighted in the Range section. Pebble counts were conducted at 18 locations on 16 streams across the Forest in association with aquatic macroinvertebrate sampling in 2010. Pebble counts at 12 of the 18 locations indicated that the average percent fine sediments (< 3.2 mm) covering larger substrates was less than 25% and compliant with the Forest Plan standard. Pebble counts at the stations on Bear Creek (downstream), Deep Creek, East Hunt Creek, Pine Creek (downstream), Red Creek, and Threemile Creek indicated that at these locations these streams were not compliant with the Forest Plan standard that less than 25% of larger substrate be covered with fine sediment.

The Bear Creek (downstream), Deep Creek, and East Hunt Creek stations are all in areas recovering from the effects of fire. Continuing fire impacts may be at least partially responsible for the increased level of fine sediments in these locations, as channels are still incising and have raw banks in some areas. The elevated levels of fine sediments in Threemile Creek may be partially attributable to summer 2010 flooding and/or unauthorized off road travel by motor vehicles up the riparian corridor from FR31042. Evidence of both these factors was observed during the 2010 sampling effort. Similarly, the Pine Creek downstream station had evidence of recent flooding; however, past pebble counts at this station show similar levels of fine sediments. Nearby roads and concentrated livestock use below the exclosure just upstream from the sampling area may be contributing to the fine sediment at this location. The elevated levels of fine sediments in Red Creek may also be related to nearby trails, unauthorized motor vehicle use of the riparian zone, and/or livestock use.

Sensitive Fish Species

All Intermountain Region Sensitive fish species are the management indicator species (MIS) for their particular water body on the Dixie National Forest including: Bonneville cutthroat trout (BCT), Colorado River cutthroat trout (CRCT), and southern leatherside. Additionally, Virgin spinedace which are managed under a Conservation Agreement and Strategy, to which the Dixie National Forest is a signatory, are the MIS for Moody Wash.

In 2010 Forest personnel coordinated with UDWR to assist in surveying BCT populations in the Pine Valley Mountains. The Reservoir Canyon and Water Canyon populations are the original remnant populations of BCT discovered on the west side of the Pine Valley Mountains in the late 1970s. Streams on the east side of the Pine Valley Mountains in the Ash Creek drainage (Harmon, Mill, South Ash, and Leap), as well as the Leeds Creek drainage (Leeds, Horse, Spirit, and Pig) were created with fish from the Reservoir Canyon and Water Canyon populations. Harmon Creek, Leap Creek, Mill Creek, and South Ash Creek were all in the area affected by the 2002 Sequoia Fire. Surveys conducted in 2002 occurred prior to the fire. The fire and post-fire flooding had significant impacts on the fish community and aquatic habitat in these streams. Qualitative sampling following the fire indicated that the density and standing crop of BCT were substantially reduced; therefore UDWR attempted to bolster these populations in 2006 with reintroductions from the Leeds Creek population.

With the exception of Reservoir Canyon, sampling in 2010 indicated that the standing crop of BCT had declined in all streams sampled. The standing crop of BCT in Reservoir Canyon and Water Canyon was artificially inflated in 2002 because drought conditions had contracted the available habitat for fish in these systems. The 2010 standing crop estimate in Reservoir Canyon was over two times higher than in 1980 and 1995 survey efforts when habitat conditions were similar to those in 2010. The 2010 standing crop estimate for the Water Canyon population was similar to the 1995 estimate indicating that this population is probably still undergoing impacts from a long-term drought in the region.

Streams from the South Ash drainage all saw a significant drop BCT standing crop estimates between 2002 and 2010. The fact that no BCT were collected in the monitoring stations on Harmon, South Ash, and Leap Creeks indicates that the habitat for BCT is recovering very slowly from the impacts of the Sequoia Fire and post-fire flooding. In late July 2009 a monsoonal storm triggered a large flood and debris flow in the South Ash Creek drainage which had dramatic habitat impacts on Mill Creek and South Ash Creek. UDWR sampling in autumn 2009 following the flood event did not find any BCT in South Ash, Mill, or Harmon Creeks.

Through 2006 aquatic macroinvertebrate sampling and pebble counts did not indicate that Leap Creek was recovering from the impacts of the Sequoia fire; however, BCT were still reintroduced in 2006. Apparently survival of these reintroduced fish, at least in the upper reaches of Leap Creek, was poor, because in 2010 no BCT were collected in two sampling stations. Stream and riparian habitat appear to be recovering in Leap Creek and the 2009 flooding did not affect this drainage. Cooperative efforts between UDWR and the Forest will continue to assess BCT distribution and habitat improvement in the Pine Valley streams affected by fire. BCT reintroductions will be attempted when appropriate.

UDWR conducted sampling of one lake conservation population of native cutthroat trout in 2010. They used a gill net to sample Short Lake in the Headwaters Boulder Creek 6th field HUC (140700050206). Short Lake was renovated with the piscicide rotenone in 2006 and 2007 to remove a stunted brook trout population and replace it with CRCT. Like many lakes on the

Dixie National Forest, the fish population in Short Lake is maintained through a UDWR stocking program. The 2010 catch rate for CRCT was 69 fish /net night, which is high for lakes on the Dixie National Forest. While a two hour net set in 1999 indicated that brook trout were probably more abundant in the lake, over 40% of the CRCT collected were larger than the largest brook trout collected in 1999, indicating the size and condition of fish in the lake has dramatically improved.

Only one southern leatherside stream, Bear Creek, was sampled during FY2010. The prior Forest sampling effort noted the presence of southern leathersides but did not enumerate all individuals seen during the sampling effort. Southern leathersides continued to be found at low densities in Bear Creek in October 2009.

Moody Wash is the only stream on the Forest known to contain Virgin spinedace. Sampling in the 1990s confirmed Virgin spinedace in Moody Wash from the Forest boundary upstream to Racer Canyon. UDWR sampling in 2002 found that Virgin spinedace maintained a similar distribution within Moody Wash. In October 2009 Forest personnel coordinated with UDWR personnel to conduct a quantitative sampling effort in Moody Wash just upstream from the Forest boundary. Virgin spinedace density was high in this area. While no density estimate was completed in 2002, UDWR collected about 50% fewer Virgin spinedace despite sampling over 8 times more area, indicating that densities were considerably higher in 2010 than they were in 2002. Additional sampling by UDWR in 2010 found Virgin spinedace distributed upstream into Racer Canyon. More qualitative sampling should be completed to determine the upstream distribution of Virgin spinedace in Racer Canyon.

Forest personnel also conducted distributional sampling in three potential Sensitive fish streams. Clay Creek is a historical southern leatherside stream that appears to have lost its fish population during a 2008 flood event. Sampling in 2009 and 2010 by Forest and UDWR personnel seem to confirm the loss of southern leatherside in this system. The Forest is coordinating with UDWR on potential reintroduction scenarios. Water Canyon Creek is a tributary to Birch Creek and contains a remnant CRCT population. UDWR personnel have found CRCT in Birch Creek up to the base of a historic grade control structure. Hall Creek is another tributary to Birch Creek that enters Birch Creek between the confluence with Water Canyon Creek and the grade control structure. Forest surveys of Birch Creek in 2010 found CRCT in Birch Creek below the grade control structure but not above it. No fish were found in lower Hall Creek. The Forest is working cooperatively with UDWR to identify opportunities to expand the range of the Water Canyon Creek CRCT population within this drainage.

Resident Trout

Forest personnel conducted quantitative fish sampling efforts for resident trout at 20 locations in 16 different streams in 2010. Eight of these surveys were at locations not previously sampled by Forest personnel. Of these eight surveys, two locations, lower Antimony Creek and Mammoth Creek, had very high estimates for resident trout standing crop when compared to other southern Utah trout streams, while Spring Creek had a standing crop near average for southern Utah trout streams. Little Creek was thought to be fishless until observations of cutthroat trout in 2009 indicated that historical stockings by UDWR were successful in establishing a self-sustaining population. Monsoon storm events created overbank flooding on Little Creek in August 2010 and evidence of the flooding was still present during sampling efforts in September 2010. No cutthroat trout were collected at the lower station, where about 10 fish had been seen during qualitative efforts in 2009; however the upstream station had an

estimate of standing crop slightly below average when compared to other southern Utah trout streams.

Pine Park Spring and Pine Park Canyon had relatively low estimates of resident trout standing crop. Pine Park spring has limited trout habitat and Pine Park Canyon is a flashy, desert stream. Both these streams have native speckled dace and desert sucker populations in addition to the self-sustaining populations of small rainbow trout.

Trout have been seen in isolated pools below North Creek Reservoir; however, no trout were collected in this area in 2010. This area is periodically dried by the operation of the reservoir. In addition large-scale flooding occurred in the drainage just prior to the 2010 sampling effort which may have eliminated any trout that had previously persisted below the reservoir. Native speckled dace were abundant during survey efforts.

Twelve of the forest locations sampled in 2010 had been sampled previously. Of these two showed a larger than 20% decline in the standing crop estimate between the prior sampling efforts and 2010. Carcass Creek showed a 38% decline in standing crop of resident brook trout between 2004 and 2010 and the East Fork Sevier River (downstream station) showed a 58% decline in resident brown trout and brook trout standing crop between 2004 and 2010. The decline at the East Fork Sevier River station was probably the result of poor sampling efficiency. Only one sampling pass was completed at this station because fish were seen evading the field generated by the electro-shocker. A second attempt to sample the station with additional electro-shocking units, and more personnel, was foiled by flooding. High flows may have also been the culprit in the apparent decline in standing crop estimates seen at Carcass Creek. Three passes were conducted because elevated flows led to poor depletion between the first and second passes. The poor depletion resulted in wide 95% confidence intervals around the 2010 standing crop estimate. Despite the substantial difference in standing crop estimates between 2004 and 2010, 95% confidence intervals suggested the difference was not statistically significant.

Monitoring of resident trout recovery following the Bear Creek fire continued in 2010. Sampling efforts at downstream station, within the moderate to high burn severity area, indicated that the fish population is starting to recover there; however, standing crop estimates at this station were still 60-70% lower than during pre-fire sampling at the upstream control station.

Blue Fly Creek was sampled by Forest personnel in 2004 they noted a community dominated by native speckled dace with few brook trout. In fact, they felt there were too few trout to warrant a quantitative sampling effort. In 2010 the community was dominated by three species of resident trout with few speckled dace and resident trout standing crop was above average when compared to other southern Utah trout streams. It appears that that fish from the East Fork Sevier River may use Blue Fly Creek during higher water years when both the quantity and quality of fish habitat is higher. Similarly, the quality of the 2010 water year may explain the dramatic increase in the resident trout standing crop estimate at the Fish Creek sampling station between 2004 and 2010.

Location of FY2010 Forest quantitative fish surveys along with the FY2010 resident trout standing crop (kg/ha), prior year(s) when Forest samplings has been conducted, and the prior year(s) resident trout standing crop (kg/ha).

Location	6th field HUC	Ranger District	2010 standing crop	Prior sample years	Prior standing crop
Antimony Creek (lower)	160300020503	Escalante	339	na	na
Bear Creek (upstream)	140700050209	Escalante	181	2008/2009	68/217
Bear Creek (downstream)	140700050209	Escalante	64	2003/ 2008/2009	196/ 0/3
Blubber Creek	160300020302	Powell	113	2004	124
Blue Fly Creek	160300020303	Powell	87	2004	na ^a
Carcass Creek	140700030303	Fremont River	80	2004	129
East Fork Sevier River (upstream)	160300020301	Powell	49	2004	46
East Fork Sevier River (downstream)	160300020302	Powell	10 ^b	2004	24
Fish Creek	140700030302	Fremont River	189	2004	83
Little Creek (upstream)	160300060108	Cedar City	50	na	na
Little Creek (downstream)	160300060108	Cedar City	0	na	na
Mammoth Creek	160300010201	Cedar City	164	na	na
North Creek (lower)	140700050104	Escalante	0	na	na
Pine Park Spring	150100100101	Pine Valley	8	na	na
Pine Park Canyon	150100100101	Pine Valley	39	na	na
Red Creek (upstream)	160300060109	Cedar City	63	2009	76
Red Creek (downstream)	160300060109	Cedar City	83	2009	47
Spring Creek	140700030302	Fremont River	62	na	na
Stout Canyon	150100080201	Cedar City	165	2004	150
Swain's Creek	160300010104	Cedar City	41	2003	21

^a Personnel found very few small brook trout and did not attempt a quantitative estimate of abundance or standing crop in 2004.

^b Only one pass was completed because many fish were seen evading the sampling equipment.

In addition to quantitative fish sampling efforts, Forest personnel conducted distributional sampling in seven streams. Distributional sampling showed that a 2002 rotenone treatment of Enterprise Reservoir combined with large-scale flooding in 2005 may have eliminated native minnows and suckers from Little Pine Creek between the reservoir and the irrigation diversion downstream. No native minnows and suckers were found in the two upstream tributaries to Enterprise Reservoir sampled in 2010, Lost Creek and Pine Canyon; however, rainbow trout from the reservoir were found running up both streams. Anecdotal records of brook trout in Tommy Creek were not confirmed during sampling in the lower portions of the creek; however, brook trout were confirmed during sampling in an unnamed tributary to Mammoth Creek upstream from Porcupine Lake. Similarly, an unnamed tributary to Little Creek was found to contain small cutthroat trout upstream to the source spring.

Location of 2010 Forest qualitative sampling efforts and species collected.

Stream	6th field HUC	Ranger District	Species collected
Little Pine Creek	160300061302	Pine Valley	None
Lost Creek	160300061302	Pine Valley	Rainbow trout
Pine Canyon	160300061302	Pine Valley	Rainbow trout
Pinto Creek	160300061401	Pine Valley	Rainbow trout, speckled dace
Tommy Creek	160300010202	Cedar City	None
Unnamed tributary to Little Creek	160300010201	Cedar City	Cutthroat trout
Unnamed tributary to Mammoth Creek	160300060108	Cedar City	Brook trout

Forest personnel coordinated with UDWR who sampled ten “resident trout” lakes on the Dixie National Forest in 2010. Lakes were sampled with gill nets. The fish populations in all of these lakes are maintained primarily through UDWR stocking programs. Two of the ten lakes sampled showed a greater than 20% decline in catch rate between the previous sample and the 2010 sample: Beaver Dam Reservoir and Long Willow Bottom. Beaver Dam Reservoir (2004-2005), Fish Creek Reservoir (2004-2005), Long Willow Bottom (2001-2002), and Round Willow Bottom (2001-2002) were treated with the piscicide rotenone as part of the UDWR’s Boulder Mountain Sport Fish Enhancement Project. The goal of this project was to reduce stunted brook trout populations in several Boulder Mountain lakes and replace them with species that would not naturally reproduce and overcrowd the lakes, such as CRCT, tiger trout, splake, and or triploid brook trout. The prior catch rate recorded at Beaver Dam Reservoir was during a period of brook trout overcrowding. The catch rate of 41 trout/net night seen in 2010 is slightly higher than the long-term mean for this reservoir and the average size and condition of trout was higher than the long-term means for the reservoir indicating that so far the management action has been successful. The scenario is similar at Long Willow Bottom and Round Willow Bottom where catch rates were lower than periods when overcrowded brook trout were present but the size and condition of fish is considerably higher now. Fish Creek Reservoir showed both a high catch rate and better size and condition for trout in 2010. Panguitch Lake also appears to be responding favorably to the 2006 rotenone treatment to remove non-game fish, the development of a new sport-fish community, and the implementation of new harvest regulations.

Lakes sampled for resident trout on the Dixie National Forest in FY2010 along with the 2010 catch rate, previous year lake was sampled, and previous year's catch rate.

Lake	6th field HUC	Ranger District	2010 number/ net night	Prior sample year	Prior sample year number/net night
Beaver Dam Reservoir ^a	140700030302	Fremont River	41	1999	56
Blue Lake ^b	140700030207	Fremont River	13	2005	7
Crater Lake ^b	140700050206	Fremont River	17	2006	15
Fish Creek Reservoir	140700030302	Fremont River	38	1999	31
Long Willow Bottom ^a	140700050103	Escalante	20	2001	32
Panguitch Lake	160300010401/ 402/403	Cedar City	57	2009	32
Raft Lake ^b	140700030301	Fremont River	20	2006	19
Round Willow Bottom ^a	140700050103	Escalante	23	2006	3
Row Lake #8	140700030207	Fremont River	3	2005	0
Upper Enterprise Reservoir	160300061302	Pine Valley	82	2006	52

^a CRCT part of the sport fish community.

^b Arctic grayling included in "resident trout" catch rate.

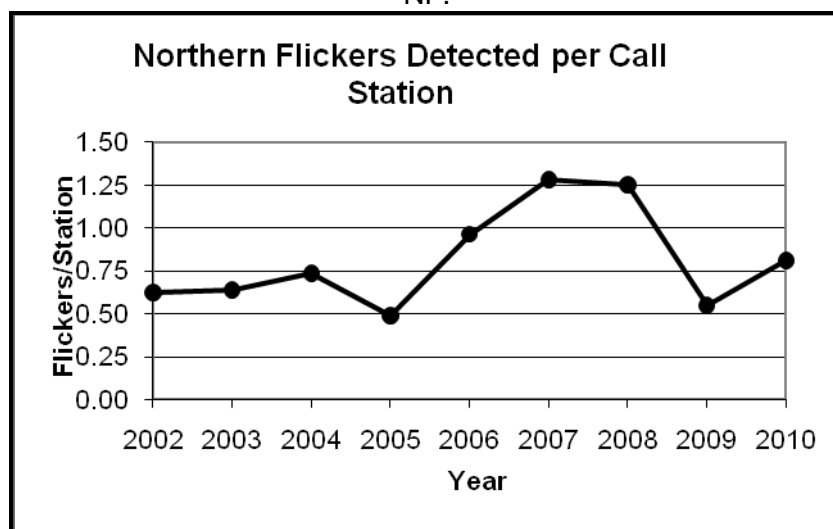


Mill Creek temperature probe site on the Pine Valley Ranger District.

Wildlife

Common Flicker

The chart below shows northern flicker detections per call station from 2002-2010 on the Dixie NF.

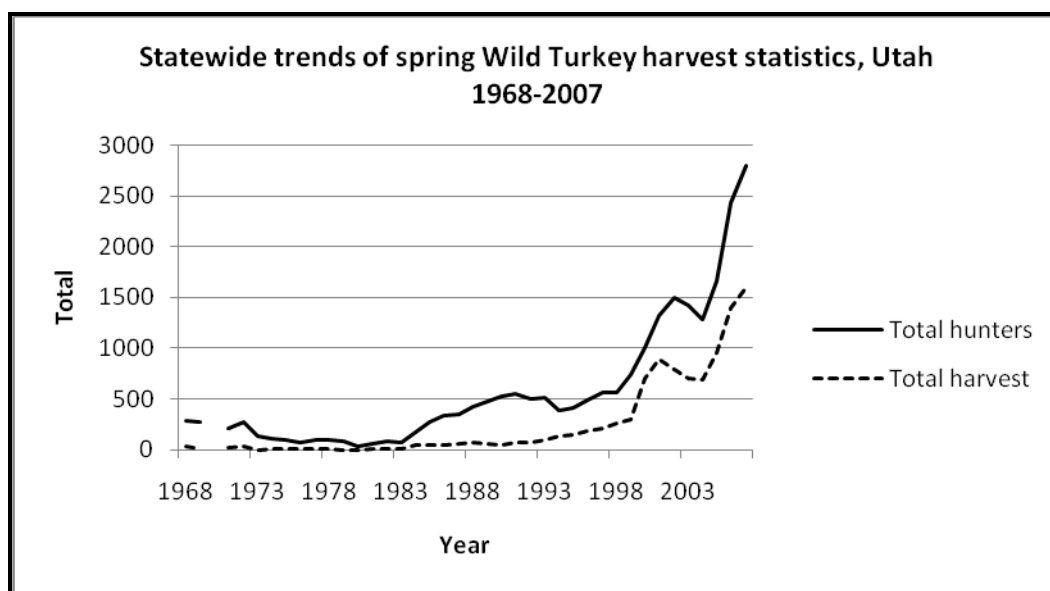


A total of 271 flickers were detected in surveys of 334 call stations, resulting in a detection rate of 0.81 flickers per station in 2010. This is an increase from 0.55 flickers per station in 2009. Detection rate was lowest in 2005 (0.49 flickers/station), and highest in 2007 (1.28

flickers/station). The variation in detection rates is likely due to changes in precipitation, insect populations, and weather conditions during the monitoring period. This species is well-distributed, occurring on each Ranger District over a variety of habitat types. Protective measures exist under the snag and downed woody debris standards and guidelines section of the Forest Plan. These measures are implemented Forest-wide, and are effective in managing and protecting important habitats for cavity nesters, including flickers. Based on these data Northern Flickers are well distributed and will continue to persist across the forest.

Wild Turkey

Utah's wild turkey populations are thriving and expanding across the state; they've grown so much, in fact, that the Utah Wildlife Board has approved Utah's first statewide general-season turkey hunt for 2010 (UDWR 2009). The RAC process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management. Based on the data provided by the UDWR (UDWR 2008), the total harvest of turkey in Utah has increased sharply in recent years. The chart below shows this increase, which also reflects an increase in birds statewide, including the Southern Region and lands administered by the Dixie NF.



*No spring season in 1970.

**2002-2004 data does not include conservation permit information.

***2005 data does not include conservation permit or landowner permit information.

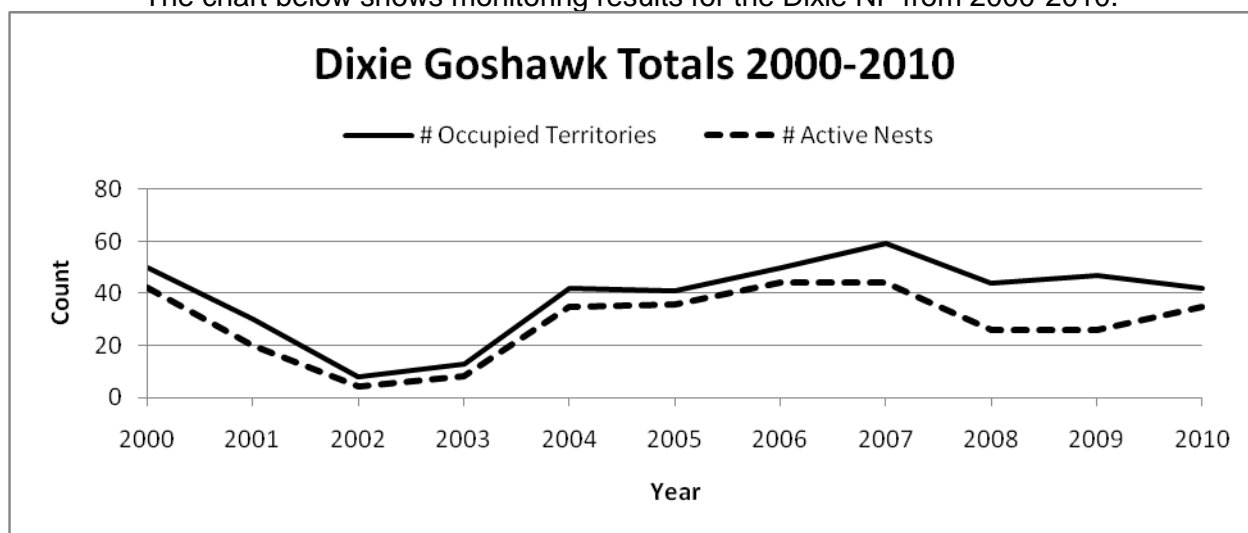
Based on this information, turkey populations are in an upward trend; therefore, populations are persistent in the Southern Region, including lands administered by the Dixie NF. Because turkeys are such a common species, they are frequently observed, and incidental sightings are recorded across the Forest. In 2010, at least 20 turkeys were observed at 11 locations.

Northern Goshawk

Out of 174 existing goshawk territories on the Dixie National Forest, 161 were monitored in 2010. Goshawk monitoring has increased in the previous six years. The increase in territories monitored is due to the discovery of new territories. Additional territories were very likely occupied, but the absence of bird detections during the site visit prevented categorizing them as such.

Northern Goshawk Monitoring Results						
Status	2005	2006	2007	2008	2009	2010
Territories Monitored	137	138	148	149	144	161
Occupied Territories	41	50	59	44	47	42
Active Nests	36	44	44	26	26	35

The chart below shows monitoring results for the Dixie NF from 2000-2010.



The total number of occupied territories in 2010 decreased slightly from 2009, but confirmed active territories increased. Factors such as temperature and timing and amount of precipitation affect goshawk distribution, survival, and reproduction. Climatic factors also impact prey species population size and distribution. Although overall numbers fluctuate, the number of occupied goshawk territories across the Forest is high and well-distributed among Ranger Districts. These results indicate that our present method of protecting the species is adequate.

Mule Deer and Rocky Mountain Elk

The Dixie NF contains portions of seven different Wildlife Management Units (WMUs) in the Southern Region: Boulder Plateau, Kaiparowits, Mount Dutton, Panguitch Lake, Paunsaugunt, Pine Valley, and Zion. Currently, elk habitat has not been defined within the Pine Valley WMU, although the Utah Division of Wildlife Resources (UDWR) manages a limited number of elk in the area. The data below comes from the 2009 Utah Big Game Annual Report (UDWR 2009). Data for the 2010 season is not available and will be presented in this report in 2011.

All big game species in Utah are managed by the UDWR. The Regional Advisory Council (RAC) process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management. The Forest Service has a

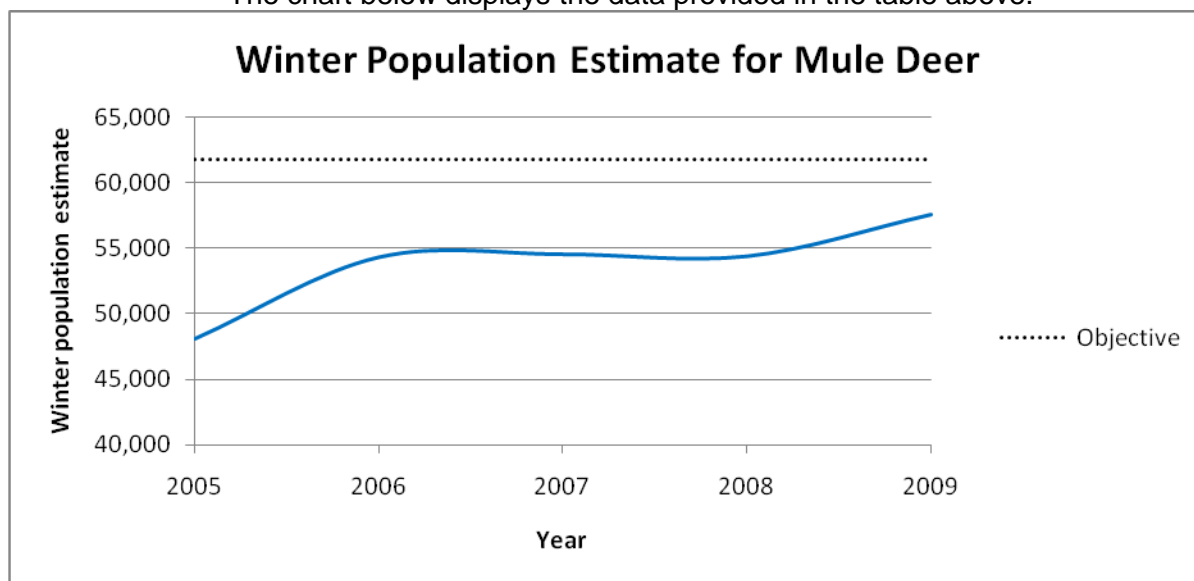
representative on the RAC; however, the Forest in no way has control over population numbers. It should be noted that a WMU may be within approved population objectives, and as a result of UDWR management strategies, population numbers may be reduced.

The table below displays winter population estimates from 2005-2009 for mule deer in the seven WMUs that overlap the Dixie NF, including two additional Boulder units. The percent unable habitat within the Dixie NF is also displayed to demonstrate how Forest Service administered lands contribute to the unit.

Mule Deer Winter Population Estimates by WMU

WMU	% Useable habitat within Dixie NF	Management Plan Objective	2005	2006	2007	2008	2009
Boulder Plateau	50%	22,600	15,400	17,000	15,800	12,000	15,500
Kaiparowits	3%	1,000	400	400	400	1,000	400
Mount Dutton	62%	2,700	1,700	2,000	2,300	2,500	2,400
Panguitch Lake	61%	8,500	7,150	8,925	8,700	10,000	10,500
Paunsaugunt	15%	5,200	5,100	6,500	6,600	6,000	5,800
Pine Valley	55%	12,800	11,700	12,500	13,400	13,400	13,400
Zion	9%	9,000	6,600	7,000	7,350	9,500	9,600
Total:	35%	61,800	48,050	54,325	54,550	54,400	57,600

The chart below displays the data provided in the table above.



*Objective determined in Deer Management Plan

The Dixie NF contains summer, winter, and year-round habitat for mule deer populations. The amount of habitat varies with WMU, altogether the Dixie National Forest administers only 35% of useable habitat within the seven WMUs. Accurate estimates of populations on the Boulder Plateau are obscured due to the addition of the Fishlake and Thousand Lakes Boulder units. With the exception of the Boulder units, only the Kaiparowits and Mount Dutton units are slightly under objective, while the other units are at or over objective. Deer populations appear to be healthy and will continue to persist across the Forest.

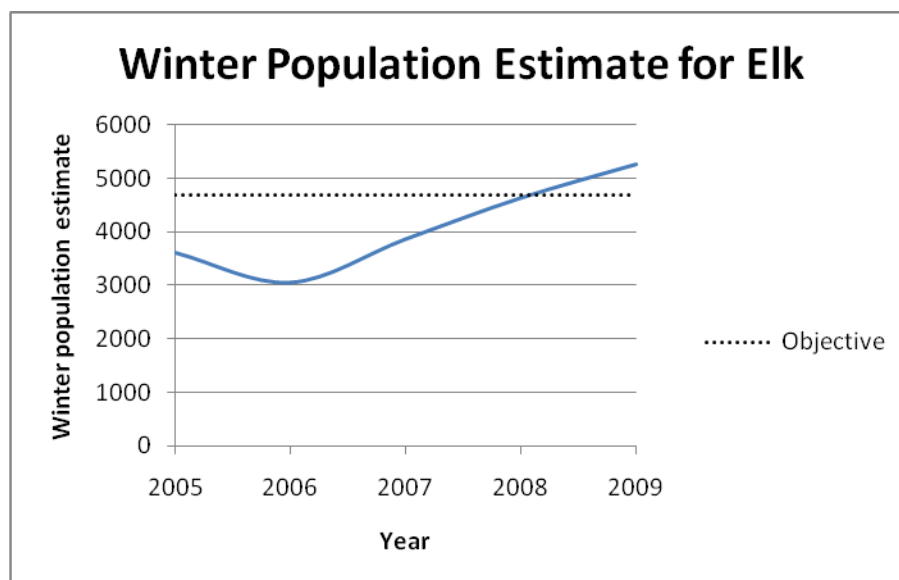
The Dixie NF contains summer, winter, and year-round habitat for elk populations. The amount of habitat within the Forest varies with WMU, although the Dixie National Forest administers only 54% of useable habitat within the six WMUs. The table below displays winter population estimates from 2005-2009 for elk in the six WMUs that overlap the Dixie NF.

Elk Winter Population Estimates by WMU

WMU	% Useable habitat within Dixie NF	Management Plan Objective	2005	2006	2007	2008	2009
Boulder Plateau	58%	1,500	400	500	900	1,500	1,800
Kaiparowits	51%	25	25	25	25	25	25
Mount Dutton	77%	1,500	1,600	1,270	1,400	1,500	2,000
Panguitch Lake	75%	1,100	1,150	872	950	1,000	800
Paunsaugunt	33%	200	75	24	30	50	100
Pine Valley	NA	50	50	50	50	50	50
Zion	5%	300	300	300	500	500	480
Total:	54%	4,675	3,600	3,041	3,855	4,625	5,255

Based on radio telemetry data collected by the UDWR, population fluctuations commonly occur on Mt Dutton, Panguitch Lake, and the Boulder Plateau. These fluctuations occur due to hunting pressure targeted to reduce numbers to meet management plan objectives. As these hunts occur herds move across units to avoid hunting pressure from cow elk hunts.

The chart below displays the data provided in the table above.



*Objective determined in Elk Management Plan

Based on the data displayed above elk populations appear to be healthy and will continue to persist across the Forest.

Snag Habitat Maintained in Desired Spatial Arrangement

At 15 sites, a total of 39 plots were surveyed for snags and logs. 12 plots (31%) reached the recommended guideline of 18+ inches dbh snags at densities of 300 snags per 100 acres. Based on these data, snag numbers of this size are inadequate across the Forest.

Downed logs were surveyed at 16 sites, composed of 40 plots. Within the ponderosa pine cover type, 14 of 16 plots contained the minimum recommended guideline of 30 logs per 10 acres. Among the 16 plots, an average of 110 logs per 10 acres was recorded, suggesting that sufficient down logs are found within the ponderosa pine cover type.

Within the mixed conifer and aspen cover types, 20 of 24 plots contained the minimum recommended guideline of 50 logs per 10 acres. Among the 24 plots, an average of 270 logs per 10 acres was recorded, suggesting that sufficient down logs are found within the mixed conifer and aspen cover types.

Downed Woody Material and Logs Maintained in Sufficient Amount, Sizes, and Spatial Locations

Downed woody debris data was collected at 40 plots in 16 sites. Within the ponderosa pine cover type, 12 of 16 plots contained the minimum required downed woody debris (50 tons per 10 acres). The average for all 16 plots was 184 tons per 10 acres.

Within the mixed conifer cover type, 16 of 19 plots contained the minimum required downed woody debris (100 tons per 10 acres). The average for all 19 plots was 389 tons per 10 acres. Within the aspen cover type, 5 of 5 plots contained the minimum required downed woody debris (30 tons per 10 acres). The average for all 5 plots was 348 tons per 10 acres.

These results suggest that on average, downed woody debris is well above the minimum as described in the Dixie NF LRMP.

Grazing Management and “At Risk” Goshawk Locations

There are currently no goshawk territories on the Forest that have been identified as being threatened by livestock grazing; therefore, no “At risk” areas have been delineated.

Timber

Timber Harvest Area

Acres harvested are monitored annually and compared to the Forest’s projected 10 year harvest estimate of 10,525 acres per year. An average of 3,295 acres in timber sales were sold annually from 1987 to 2010, with an average of 2,832 acres actually harvested within those sales. Actual harvested area is well within the 10 percent of the 10 year estimate.

Timber Sale Acres Sold and Harvested, 1987-2010

Year	Total Acres Sold	Total Acres Harvested
1987	5,656	84
1988	5,369	2,946
1989	7,193	3,590
1990	5,184	7,454
1991	7,403	5,029
1992	2,907	6,629
1993	4,366	4,962
1994	2,044	3,807
1995	822	1,411
1996	11,762	4,068
1997	5,131	6,600
1998	4,092	3,743
1999	2,695	3,332
2000	1,553	6,196
2001	536	1,173
2002	804	990
2003	449	856
2004	2,266	144
2005	1,500	539
2006	230	723
2007	4,604	1,354
2008	1,191	1,824
2009	616	318
2010	709	200
TOTAL	79,082	67,972

Suitable and Unsuitable Land Classifications

The Forest continues to update land classification for suitable timber through timber sale planning and other timber inventories. The following table describes the updated number of total acres that are classified as suitable for timber production, and the number of timber sales that have been planned from 1987 to 2010.

Number of Sales and Acres Verified for Timber Suitability, 1987-2010

Ranger District	Number of Sales	Total Acres Verified
Cedar City	43	119,964
Escalante	20	95,362
Powell	6	28,204
Teasdale	14	25,505
Total	80	269,035

The Forest Plan has identified 300,100 acres of land suitable for timber, which is greater than the total of 269,035 acres above. However, an accurate comparison is not possible until classification of timber stands is completed, which is ongoing.

Harvest Practices in Retention/Partial Retention

Of 140 timber sales planned and implemented from 1987 to 2010, 50 had no design features identified in the landscape architect report. Of the remaining 90 sales for which design features were recommended, all contained the design features in the environmental document and in the silvicultural prescription. Of these 90 sales, seven have documentation of post sale monitoring completed by a landscape architect, and twelve sales are still in progress. The remaining 71 sales have no documentation of post sale monitoring. On three sales the Visual Quality Objectives (VQOs) were not met in the first Forest Plan decade (1987-1998) because bark beetle suppression objectives took priority over full accomplishment of visual quality objectives.

VQOs were documented as met on four completed sales (6 percent) of those with design features measures identified in the landscape architect report. There is no documentation to determine if VQOs were accomplished on the remaining 94 percent of the completed sales for which design feature measures were identified.

Harvest Practices in Riparian Areas

Past reviews of timber harvest has occurred around riparian areas. In the most recent review 26 sales that contained riparian areas, including isolated springs to streams and ponds, were looked at to determine if harvest resulted in unacceptable impacts. The hydrologist's recommendations were tracked through the environmental analysis, silvicultural prescription, marking guidelines, and contract/sale area map in the documents. A review of silvicultural prescriptions suggests that existing timber sale contract provisions, when fully implemented with a map, are adequate to protect and maintain riparian areas in their existing condition.

During project planning, specific restrictions (buffer zones) or special harvesting practices intended to protect riparian areas were identified. Most of these were carried into the environmental analysis as stated in the report. Recommendations were based on informal field visits. Several projects contain general recommendations such as "protect riparian areas." Most of these recommendations were included in the environmental analysis.

Twenty-one of 26 sale area maps showed the riparian areas identified by the hydrologist. Eighteen of these showed all of the riparian areas identified. The riparian areas have been adequately protected in 17 of 18 sale areas that were reviewed on the ground.

Adequate Restocking

Most areas that were harvested through a final harvest treatment prior to the adoption of the Forest Plan have regenerated to an adequate restocking level. Most of the acres planted since 1990 have been associated with the Engelmann spruce bark beetle epidemic, which has destroyed much of the mature spruce on the Forest. Survival rates for the planted spruce seedlings planted in 2010 have been excellent in the first year with 94 percent survival. Third year surveys for past spruce plantings are indicating survival rates at 68 percent. Spruce restoration has been highly successful where seedlings are established, this work is expected to continue for at least the next decade.

The Forest has begun planting ponderosa pine in burned over areas that are in need of reforestation. These planted areas have occurred on a variety of sites including some that are on harsh sites that were severely burned. The survival rates were excellent in ponderosa pine that was planted in 2010 with survival rates of 92 percent. Third year survival rates of

ponderosa pine was 87 percent. A crucial aspect to ponderosa pine seedling survival was the installation of vexar tubing to protect seedlings from browsing.

Climate continues to be a challenge to seedling establishment. Drought has continued to affect survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils. Also, the use of microsites has improved survival rates. These high survival rates are encouraging and most of these planted areas are expected to contain adequate stocking within five years.

Maximum Size of Openings Created by Clearcuts

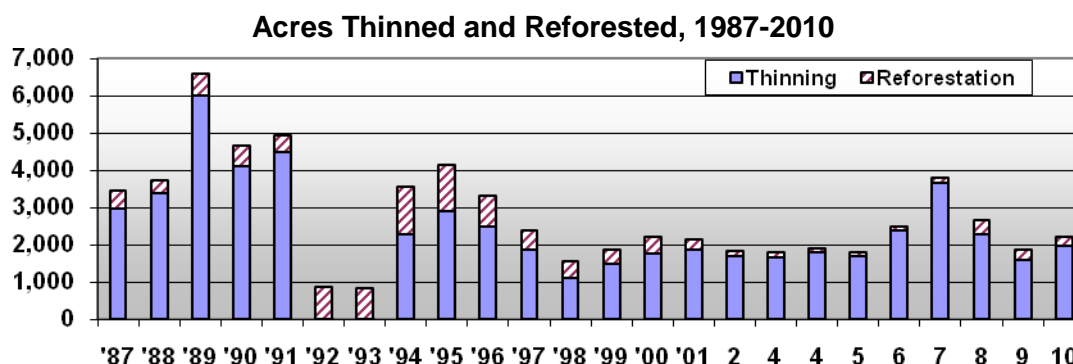
Numerous areas less than 40 acres in size were clearcut from 1987 to 2010 to meet regeneration and disease control objectives. There have been no perceived or recorded adverse effects to harvest practices, visual quality, or other resources values because of the size or location of the clearcut.

Reforestation and Timber Stand Improvement (TSI) Accomplishment

Thinning and reforestation accomplishments to date have not met the projections of the Forest Plan due to the decline in the timber harvest program and the accomplishment of most thinning needs early in the monitoring period. The Forest Plan projects 5,000 acres per year in thinning and 1,588 acres per year in reforestation.

TSI accomplishments in 2010 included precommercial thinning of almost 1,964 acres including over 500 acres that are part of the Duck Creek Fuels Reduction project on the Cedar City RD. Over 650 acres of mistletoe control was conducted on the Powell RD, while over 760 acres of TSI was accomplished on aspen stands on the Esclante RD.

Reforestation in 2010 includes over 120 acres of planting of Engelmann spruce seedlings in high spruce beetle mortality areas on the Cedar City RD. Also, over 130 acres of ponderosa pine planting occurred on burned areas of the Escalante RD.



Fuelwood Consumption and Supply

Vegetative management practices on the Forest result in the availability of an estimated 14,000 cords of fuelwood annually. During the first five years of the Forest Plan period, an average of 7,446 cords of fuelwood was utilized each year. After natural gas was delivered to the major population centers in the area, the fuelwood consumption has declined to approximately 5,000 cords per year. In the past 10 years, the Forest has experienced catastrophic Engelmann

spruce tree mortality due to a spruce bark beetle epidemic. This has resulted in thousands of acres of dead trees and heavy volumes per acre of fuel loading, contributing to an increasing amount of fuelwood availability.

Timber Supply Projections

The latest Forest inventory (1998) showed the following results regarding sawtimber on non-reserved timber lands (i.e., lands not specifically designated for timber harvest):

- Net volume is 3,534,863 MBF (thousand board-feet),
- Net annual growth is 45,134 MBF, and
- Annual mortality is 53,763 MBF.

Timber Research Needs

Long term monitoring for spruce beetles (*Dendroctonus rufipennis*) continues on the Griffin Top area of the Aquarius Plateau on the Escalante Ranger District. These studies are designed to determine infestation levels in harvested and non harvested forested areas. These studies conducted by the Dixie National Forest and Forest Pest Management (FPM) are indicating that while spruce beetle caused mortality has decreased on the Plateau, many stands are still at high to moderate susceptibility, and are of concern because spruce beetles are capable of long distance dispersal, and with the general depletion of host resources on Griffin Top, populations may begin to spread north and east (Hebertson 2010). One conclusion so far is that, prevention strategies including silvicultural treatments, such as thinning and group selection offer the greatest chance of reducing long-term susceptibility to spruce beetle infestation because they increase diversity of species and structure across the landscape. If silvicultural treatments are used, they must occur while spruce beetle populations are at low levels to maximize their effectiveness (Hebertson 2010). Spruce beetle monitoring will continue in this area.

Also, the Forest, in conjunction with FPM, has been looking at timber harvest and slash treatment methods to control the spread of Tomentosus root rot (*Inonotus tomentosus*) in Engelmann spruce and blue spruce. This disease has been detected by pathologists in several stands of blue spruce on the Aquarius Plateau. Recommendations have been root disease in several stands in the Row Lakes project area. Although only blue spruce trees were infected, this root disease is known to infect all spruce species throughout south-central Utah. Harvesting, particularly partial cutting, could intensify the root disease and potentially affect residual spruce or spruce regeneration. Recommendations are to minimize partial cutting in those portions of stands where Tomentosus root disease is prevalent or favor disease tolerant species such as aspen or Douglas-fir where possible (Hebertson 2010).

Protection – Fire

Adequacy of Fire Prevention Programs

We measure the adequacy of our prevention programs by the number of human-caused fires. As shown in the table below, there were 11 human-caused fires with a total of 1 acre burned in 2010. The number of human-caused fires is slightly higher than the 5 year average of 9, but acres burned is significantly below the 5 year average of 776 acres. Initial attack on human-caused fires was very effective.

Number and Acres of Human-caused and Lightning-caused Fires in 2010		
Type of Fire	Ignitions	Acreage
Wildfires-lightning	26	1,044
Human-caused	11	1
Total	37	1,045

Number of Wildfires and Acres Burned

In 2010 a total of 1,045 Dixie National Forest acres were burned, well below the five year average of 7,130 acres. There were 37 wildfires on the Forest, with the acreage distributed across all districts.

The Escalante Ranger District of the Dixie National Forest had the largest fire of the season. The Little Jake fire started from lightning on August 18th and grew to 733 acres, all on Dixie National Forest lands. The next largest fire on the Forest was the lightning caused Skunk Creek Fire at 233.

Fire Management Effectiveness Index

We no longer use this reporting method because it does not adequately measure success of the fire program. As a surrogate for this obsolete metric, initial action effectiveness is calculated. Of the 37 fires in 2010, none escaped initial action efforts. This equates to a 100 percent initial action success rate for this year. This high success rate also means that suppression expenditures were minimized. Typically, higher suppression costs are attributable to larger fires.

Compliance with Fuel Loading Standards

The Dixie National Forest used prescribed burns, wildfires and mechanical treatments to reduce fuel loading. Fuel treatment effectiveness was monitored across the Forest by establishing and re-measuring sampling locations for both fuels treatments and wildfires. This involved data gathered from more than 400 plots across the forest. In 2010 the Forest treated 4,596 acres using prescribed fire, 1,045 acres treated with wildfire and 6,265 acres using mechanical treatments for a total of 11,906 acres treated. An additional 3,261 acres of hazardous fuels treatment was completed in and around Duck Creek village utilizing ARRA funding. 11,939 acres of additional treatment are under contract in the same area utilizing ARRA funds scheduled for completion over the next three to five years.

Protection – Insect and Disease

Population Levels of Insects and Diseases

Localized mountain pine beetle (*Dendroctonus ponderosae*) and western pine beetle (*Dendroctonus brevicornis*) buildups have been observed over the years as sustained drought conditions have created greater moisture stress and stand susceptibility, particularly in older trees. Approximately 2,000 mountain pine beetle infested trees were treated in the Panguitch

Lake Campground in an attempt to retain the important tree cover at that site. In 2002 the campground was non-commercially thinned to reduce tree densities and subsequent risk of bark beetle infestation. The pine bark beetle, along with limb rust and mistletoe, is slowly killing the over-mature ponderosa pine on the Forest.

A spruce beetle (*Dendroctonus rufipennis*) population grew to epidemic levels on the Cedar City Ranger District in the early 1990s. The beetle outbreak spread across the Markagunt Plateau, essentially killing all of the over-mature/mature and intermediate Engelmann spruce trees over thousands of acres. By 2003, the Engelmann spruce component on the Cedar City Ranger District had been altered from an over-mature stand structure to total stand replacement in some areas and small seedling/saplings in others. Over the next century the spruce-dominated landscape will revegetate to seral aspen stand structure.

In the mid to late 1990s, the spruce beetle population grew to epidemic levels on Mount Dutton on the Powell Ranger District. Here, too, the mature/over-mature spruce stands have been replaced with aspen and subalpine fir because of the Engelmann spruce mortality. Since the early 2000s spruce beetles have been active on the Escalante and Teasdale ranger districts. Aerial Detection Surveys from 2003 to 2007 had estimated more than 100,000 Engelmann spruce trees have been killed by spruce beetle on the Escalante Ranger District. These epidemic outbreaks resulted in replacement of mature/overmature spruce stands with a composition of aspen, subalpine fir, and small diameter sized Englemann spruce. Spruce beetle populations continue to be looked at including annual beetle trap monitoring on the Griffin Top of the Escalante District.

Recently the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and fir engraver beetle (*Scolytus ventralis*) populations have been building and killing large areas of Douglas-fir and white fir trees. The pinyon ips beetle population has reached epidemic levels in some areas in the pinyon/juniper type and has killed large areas of pinyon pine.

Root rot continues to be widespread. A research/treatment program initiated in the Peterson Grove area on the Teasdale Ranger District and localized treatments have been prescribed in timber sale projects. Results of the research and treatments are pending. Timber sale prescriptions and cultural treatment activities appear to have reduced the incidence of limb rust in ponderosa pine.

Insects and disease have increased over the past 10 years overall. This has prompted more dead spruce salvage and delayed other treatment activities.

Effectiveness of Dwarf Mistletoe Suppression Projects to Protect Regeneration

Dwarf mistletoe treatments have been prescribed in all affected timber sale project areas initiated in the period since the Forest Plan was adopted in 1986, and thousands of acres within individual control projects have been completed. Permanent plots have also been established to monitor the long-term effects of mistletoe on tree growth, though these studies are not complete at this time.

Treatment prescriptions and projects have been successful in reducing localized dwarf mistletoe infections. However, the disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

Range

Range Vegetation Condition and Trend

During 2010, 254 long-term trend monitoring studies were completed on the Dixie National Forest. 181 were upland range trend monitoring studies, 52 of these monitoring studies were Level III Riparian Inventories and 21 were photo points completed by Forest personnel. 153 of 181 FS upland range trend monitoring sites (85%) were replicated studies from which accurate trend data can be derived. 32 of 52 of the FS Level III Riparian Inventories (62%) were replicated and have accurate trend available. Only 1 of 22 photo points (5%) was replicated and photo interpretive trend on only one site is available.

Of the 153 replicated upland range trend monitoring studies, the data analysis on 60 of them (39%) indicate a downward trend in vegetation condition, effective ground cover, and/or frequency of invasives. The other 93 sites (61%) demonstrated stable or upward trends. 17 of the 60 monitoring sites (28%) that indicate downward trends are located in areas of the Dixie National Forest that have burned (wildfire or prescribed fire) or been mechanically treated within the past 10 years. These burned and mechanical treatment areas are highly susceptible to cheatgrass invasion and low effective ground cover resulting from reduced fuel loads. There are a total of 10 monitoring sites of 153 sites (7% of all upland trend studies re-read in 2010) where downward trends may be a result of mechanical or prescribed burn project-level management activities not influenced by uncontrolled wildfire. These 10 monitoring sites are located on 9 pastures of the Cedar City, Powell, Escalante, and Teasdale (Teasdale portion of the Fremont River Ranger District) Ranger Districts. In summary, 43 monitoring sites of 153 sites (28% of all upland trend studies re-read in 2010) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 32 replicated Level III Riparian Inventories, the data analysis on 6 of them (19%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on the Pine Valley, Cedar City, and Escalante Ranger Districts. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. A total of 26 of the replicated Level III Riparian Inventories (81%) demonstrate a stable or upward trend since they were last read in 2005.

There was only one photopoint re-taken in 2010 with trend available at this time. This photopoint indicated a downward trend in ground cover. This photopoint was located on the Jergy/Sulphur pasture of the Teasdale Ranger District (Teasdale portion of the Fremont River Ranger District). Further evaluation of this site may be warranted to determine if a change in management direction is needed and able to improve this site.

In 1986, the Forest Plan did not define vegetation and soil (ground cover) conditions that would serve as a baseline from which to measure. Therefore, there are no reference conditions (from 1986) from which to measure trend. Since there is no baseline, sole reliance is placed on measuring trend during a defined time frame, from one long-term trend study reading to another. Therefore, variation that would cause further evaluation may be appropriate. Of the 254 monitoring studies and photo points reported here, 186 (73%) had previously established baseline studies using current methodologies where accurate trend data or photo interpretation could be derived. Other study sites may have previous readings, but this data was collected

using various methods which are not compatible with current measurements and/or locations and photos could not be replicated. In the absence of periodically recorded post-1986 data, we cannot project a clear picture of how much the range has improved or declined over 1986 levels on the Dixie National Forest. However, current trend re-read from 2000-2005 does give a clear picture of trend on the Forest between then and 2010. Of the 186 sites re-read and evaluated in 2010, 67 (36%) exhibited downward trends since these sites were last read between and inclusive of the years 2000-2005.

The Forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2010 and in previous years (649 FS upland range trend monitoring studies, 203 Riparian Level III Inventories, and 171 photo points from 2004-2010). Over time, these studies will be repeated and trend data will become available. This data is stored in a retrievable database where it can be accessed and additional repeat studies can also be stored and compared.

Riparian Condition

Successional Status: The Forest Plan requires the Forest to maintain riparian areas at $\geq 60\%$ of potential for management level 3 riparian areas. Potential for late seral community types is defined by % gradient and substrate classes (Dixie NF LRMP IV-41 amended 9/95; revised 3/96). In a sample of 52 riparian sites across the Forest during 2010, 30 of the sampled riparian areas (58%) are maintained at 60% of potential or above as required in the Forest Plan for management level 3 riparian areas. 22 riparian sites or 42% are not being maintained at 60% of potential as required by the Forest Plan. 3 of these 22 riparian sites not meeting Forest Plan requirements are on the Pine Valley and Powell Ranger Districts and are the direct result of the Hawkins and Sanford wildfires burning through these areas in 2004 and 2002, respectively. These riparian areas have not yet recovered from these large wildfires. Therefore, there are a total of 19 monitoring sites of 52 (37% of all Level III Riparian Inventories performed in 2010) where downward trends may be a result of management activities not influenced by uncontrolled wildfire. The riparian areas that are not meeting Forest Plan requirements are located on the Pine Valley, Cedar City, Powell, and Escalante Ranger Districts of the Dixie National Forest. Therefore, further evaluation of these riparian sites may be warranted to determine if a change in management direction is needed and able to improve them.

Stream bank stability: Forest Plan standards and guidelines for bank stability (general direction – standard and guideline 4A – pg. IV-42) and wildlife and fish (general direction - standard and guideline 6B – pg. IV-33) require that we “maintain 50 percent or more of total stream bank length in stable condition”. For this analysis, this standard is interpreted as maintaining 50 percent of all riparian areas with at least a moderate bank stability rating. Out of the 52 Level III Riparian Inventories sampled on the Dixie National Forest in 2010, 49 or 94% had streambank stability ratings that were rated as moderate, good, or excellent. These ratings indicate long-term stable bank conditions in these riparian areas. There were 7 sample sites evaluated for the East Fork of the Sevier River drainage in 2010. Of these 7 sample sites evaluated, all 7 (100%) of them had streambank stability ratings that were rated as good or excellent. The 2010 sample of riparian areas on the Dixie National Forest are meeting this Forest Plan standard and guideline. Therefore, no further evaluation and/or change in management direction is needed at this time.

Percent Ground Cover: Forest Plan standards and guidelines specific to management areas 4A, 9A, and 9B for ground cover in riparian areas (management area 4A direction – standard and guideline 4B – pg. IV-79, management area 9A direction - standard and guideline 3B – pg. IV-

141, and management area 9B direction – standard and guideline 3B – pg. IV-150) require that the Forest: “Maintain at least 80 percent of potential ground cover within 100 feet from the edges of all perennial streams, lakes and other water bodies, or to the outer margin of the riparian ecosystem, where wider than 100 feet.”. Since no potential ground covers have been defined for riparian areas on the Dixie National Forest, for the purpose of this analysis, potential is assumed, inappropriately, to be 100 percent for all riparian areas. Out of the 52 Level III Riparian Inventories sampled on the Dixie National Forest in 2010, 19 fell within management areas 4A, 9A, or 9B (all were in 9A). Of these 19 studies, five study sites, or 26%, had ground covers of less than 80% along the greenline. Only one of these five study sites that are below the Forest Plan standard have reduced ground cover resulting from wildfire. These five study sites not meeting Forest Plan standards and guidelines for ground cover in special management area riparian systems occur on the Pine Valley, Cedar City, Powell, and Escalante Ranger Districts (Teasdale portion of the Fremont River Ranger District). Percent ground cover on these sites not meeting the standard may need to be evaluated to determine if a change in management is needed and able to improve them.

Forage Utilization

During the 2010 grazing season, 59 of 76 allotments (78%) were reported to have been monitored for compliance with Forest forage utilization standards. A total of 146 pastures were monitored within the 59 allotments. Of the 146 pastures monitored, 143 (98%) were in compliance with the Forest Plan. Stubble height, height/weight method, key species method, ocular reconnaissance, and photo documentation were the primary methods used for assessing utilization compliance.

Of the three allotments monitored on the Pine Valley Ranger District, all met utilization standards.

Twenty-one of the 22 allotments on the Cedar City Ranger District stayed within utilization standards. Riparian utilization standards were exceeded in the Yankee Pasture on the Bowery Allotment.

Eleven allotments on the Powell Ranger District were monitored in 2010. All monitored pastures were within Forest utilization standards.

Fourteen allotments were monitored on the Escalante Ranger District. Over utilization was found in certain portions of the Posey Lake Pasture on the Pine Creek Allotment and in the Big Swale/Clayton Pasture on the Coyote Allotment.

Overall the Forest is having good compliance with forage utilization standards. Management actions taken this year solved most of the problems identified in 2009, the exception being the Posey and Big Swale/Clayton Pastures on the Escalante Ranger District. Continued adjustment in management will be needed to address those areas.

Wild Horse Numbers and Habitat Trends

On January 26, 2010 the Bureau of Land Management (BLM) conducted a helicopter inventory of wild horses on the BLM North Hills Horse Management Area (HMA), which includes the Forest Service North Hills Wild Horse Territory managed by the Pine Valley Ranger District.

On the North Hills HMA a total of 187 head of wild horses were counted. There were 26 yearlings counted on the HMA. It is estimated that 90% of the horses on the HMA were counted because of the good snow conditions and coverage of the flight. The estimated population for the HMA is 208. This HMA does not see much interchange from horses from other HMAs, but some does occur with adjacent HMAs in Nevada. Horses from other wild horse HMAs have been introduced to the HMA in the past to maintain genetic viability. However no new horses have been introduced to the HMA since the last population inventory. Though not proven, it is suspected that as many as 20 head of domestic horses have been set loose on the HMA.

Key points to note with FY 2010 Population inventory.

- Reproduction rate is less than 20% which is normally used to estimate population growth on this HMA. The reproduction rate could be affected by domestic horse turn out.
- Estimated numbers of wild horses on the HMA was lower without population inventory.
- Horses were in good condition.
- No young colts counted during this time of year.
- It is believed some domestic horses have been released into the HMAs.
- Elk use of this HMA has increased in the last 10 years from 0 to 20-40 head yearlong.

During the summer a total of 18 horses were gathered and removed from the unit. Distribution of horses across the unit continues to be managed through salting and water availability. A coordinated removal with the BLM is scheduled for early in FY 2011.

Developed Recreation

Facility Capacity and Developed Site Service

Heavy spring snow prevented the forest from our normal opening date in 5 major campgrounds. During 2010, the Persons At One Time (PAOT) figure for all developed recreation sites on the forest was 8,374 and the daily seasonal capacity was 1,882,143 PAOT days. During 2010 the forest had a total of 742,665 PAOT days to standard.

Downhill Ski Use

Brian Head Resort reported 142,079 skier visits for the 2009-2010 for winter season.

Scenic Quality

The landscape integrity or the intactness of the landscape has been degraded in the past fifteen years by bark beetle outbreaks in Ponderosa Pine, Spruce and Douglas Fir stands in many places throughout the forest. Seeing dead trees is a natural occurring process; however the scale and magnitude of these events trigger a change in landscape character and does not meet scenic integrity objectives. Acres affected are unknown at this time. Stands of spruce trees on some districts are approaching 100% mortality. The negative response from the public is substantial. Some surveys have been done and records kept of this public concern. Dead gray trees and dying red trees can be seen from most state highways and forest roads.

Dispersed Recreation

Dispersed recreation use numbers increased slightly from the previous year. Most trail counts were static or slightly higher. Most of the high use trails tend to be either scenic destination and/or mechanized/motorized route. Across the forest non-motorized use numbers were higher in 2010 than previous years. Winter trail use (both motorized and non-motorized) also increased over previous years. Winter non-motorized trail use likely increased due to the development of the Deer Valley Nordic Ski Area.

Cultural (Heritage) Resources

Completion of Cultural Resource Investigations For All Site-disturbing Activities Where No Site Inventory Has Been Completed

Federal Law requires the Forest Service to conduct surveys for Historical and Archaeological Resources prior to all ground-disturbing projects. During FY 2010 we surveyed or evaluated 27 projects totaling approximately 15,550 acres. Of the 27 project three of the projects were conducted by outside contractors as part of power line, gas line or large scale survey. During these surveys we found 647 archaeological and historical sites. Of these only 135 were found not to be eligible for the National Register of Historic Properties. All Historic Properties identified were avoided by all project activities. The Forest has met all the requirements in the law regarding cultural resources.

Facilities

Road and Bridge Construction and Reconstruction

9.1 miles of level two roads and 11.1 miles of levels 3 and 4 roads were improved in 2010. No roads were constructed in 2010.

In 2010 the Dixie received funding for several large CIP roads projects. This allowed public works road reconstruction to take place at a much higher than normal rate. Timber harvest is at about 25% of levels during the 1980's, which accounts for fewer miles constructed or reconstructed. Since the forest plan was written the emphasis has shifted to reconstructing existing roads. New road construction has declined significantly. This trend is expected to continue.

Road Management

During 2010 there were no random sample roads selected from the RO or the WO. Monitoring efforts were focused on the following:

- Hazard marker signs on cattle guards.
- Inventoried signs on 52 cattle guards, installing new signs on 33.
- Hazard marker signs on bridge abutments.
- Inventoried signs on 18 bridges, installing 19 weight limit signs.

- Sign inventory and installation on level 3 and level 4 roads.
- Monitored signs on over 50 routes and installed 50 new signs.
- Monitoring signing efforts in motorized travel plan (MTP) implementation areas.

No random sample was taken, but it is difficult to determine the trend in the condition of existing roads with a small random sample as it may or may not accurately represent the entire road system. A great focus point for roads is appropriate signing in conjunction with the Forest's motorized travel plan.

Buildings

Approximately 65 facilities that were monitored in FY2010

All buildings have been inspected over the past ten years. Inspections revealed buildings in various states of condition. Buildings that are in use are maintained to a reasonable standard. Abandoned or unused buildings are not adequately maintained and are to be explored for decommissioning, conveyance or alternate use.

Buildings that are in use and necessary to support the Forest's daily operations are to be maintained to a reasonable standard. Buildings that are abandoned or do not support the Forest's daily operations are not maintained as adequate funds are not available to maintain all buildings. Because this trend will continue, the Forest is in the process of re-writing its Facility Master Plan to better manage the facility deferred maintenance back-log.

Dam Administration

All high hazard dams were inspected –per agreement – by the State of Utah with coordination of Forest Engineering Personnel. The following dams required inspection by the Forest according to the existing Memorandum of Understanding with the State of Utah, Division of Water Rights.

1. Aspen Mirror Lake
2. Lower Barker
3. Upper Barker
4. Round Willow Bottom
5. Long Willow Bottom
6. Joe Lay
7. Roundy Reservoir
8. Jacob's Reservoir
9. Pollywog

Forest owned dams (Pine Valley Reservoir, Flat Lake, Robs Reservoir, Pine Creek Reservoir and Posey Lake) and forest maintained dams (Navajo Lake, shared with state) continue to be under-funded, and in need of heavy maintenance and/or reconstruction. The Navajo Lake dam has breached twice in the past 3 years. The dam is not currently functional and is not funded for repair in 2011. This will have a negative impact on the 3 campgrounds, lodge and special use cabins adjacent to the lake. The hazard class of the Pine Valley reservoir was raised from low to medium in 2010 in part because of the lack of maintenance.

Compliance with Utah Public Drinking Water Regulations

All drinking water systems on the Dixie National Forest have been monitored in accordance with State and Federal standards in 2010 with the following exceptions:

- Navajo Basin Water System (includes Olsen, Boy Scout and Larsen Springs)

- Panguitch Lake Water System

All completed nitrate and sulfate monitoring returned acceptable results. One coliform test exceeded the allowable maximum contaminant level. This test was taken at the Posey Lake water system. Follow up testing was not completed as the campground was shut down for the season.

Lands

Special Use Permits, Applications, Amendments and Transfers

In 2010 we processed 15 applications. This includes new authorizations and amendments.

Special Uses (non-recreation) Permit Administration and Inspection

2010 permits administered to standard was 165.

Construction of Through Utilities

Presently there are three electric transmission line proposals being analyzed. These are Tropic-Hatch 138 kV (Garkane Energy), Sigurd-Red Butte #2 345 kV (Rocky Mountain Power) and TransWest Express 600kV (TransWest Express LLC). Construction has not occurred on any of these proposals.